Table of Contents

Chapter 10—Monitoring, Review and Revision

Purpose of Monitoring

Approach to Monitoring

Monitoring Species of Greatest Conservation Need
Monitoring Needs
Monitoring Projects

Monitoring Conservation Actions

Review and Revision

Chapter 10—Monitoring, Review and Revision

Purpose of Monitoring

The following chapter describes the District's plan for monitoring the species and conservation actions identified in this CWCS and subsequently reviewing and revising the CWCS, as required by Elements #5 and 6.

The primary goals of the monitoring projects are to:

- Determine the status and trend of species of greatest conservation need
- Measure the success of the conservation actions
- Adapt conservation actions to new information and changing conditions
- Build a central database of wildlife information

Monitoring allows conservation agencies and organizations to measure changes in:

- Species status, trend, distribution, and response to conservation actions
- Habitat locations and condition
- Threats
- Implementation priorities
- Information and conditions

Approach to Monitoring

To assess changes in species populations and habitats, monitoring projects target multiple levels on local, regional and national scales. The levels include:

- Species of greatest conservation need
- Priority habitats
- Conservation actions

The purpose of this multi-level approach is to be able to measure not only the status of the species, but also the status of the habitat and the effectiveness of the conservation actions. The species level is detailed in the first section of this chapter. The second section details the plan for monitoring conservation actions.

Monitoring Species of Greatest Conservation Need

The District's plan involves a three-tiered approach to monitoring species of greatest conservation need:

1. Coordinate existing projects
2. Expand existing projects
3. Develop new projects

The role of coordinating and overseeing the monitoring process during the implementation phase of the CWCS belongs to the DC Fisheries and Wildlife Division. However, a major strategy of the monitoring plan is to work in partnership with other monitoring agencies and organizations and to coordinate existing monitoring projects. Currently, many existing monitoring projects are being implemented by national, local and nongovernmental agencies and organizations, as well as by universities and the general public. The CWCS will absorb and incorporate existing monitoring projects into one comprehensive and strategic conservation plan.

For example, much of the land in the District is managed by the National Park Service (NPS), which conducts monitoring projects using established monitoring protocols. Several of their standard monitoring protocols will be useful for other areas in the District that are not managed by NPS. Thus, a strategy of the District's monitoring plan is to implement NPS monitoring efforts District-wide.

It is very important for the District to include these existing projects in its effort to monitor wildlife. There is no current central coordination of the data and often these efforts are conducted too infrequently to be effective due to irregular or insufficient funding. Therefore, a product of this CWCS will a central database with meaningful data on species status and trends that will help the District design the best possible conservation actions for those species and their habitats. In cases where the existing projects have restraints or resource gaps, this CWCS serves to fill those gaps and ensure that the monitoring projects are efficient and successful.

Where possible, this chapter includes plans to:

- Coordinate existing monitoring projects to prevent redundancy,
- Expand existing monitoring projects to cover the entire District,
- Tailor existing monitoring projects to target the species of greatest conservation need, and
- Implement existing monitoring projects in a timeframe under which the effectiveness of the conservation actions can be measured at appropriate intervals.

For species of greatest conservation need that are not covered under any of the existing projects, new monitoring projects are proposed that target those species. Other projects may target common habitats rather than individual species. Regardless, the projects listed in this monitoring plan are grouped by wildlife taxa and generally follow standard monitoring protocols for each taxa.

The District's monitoring plan will incorporate and centralize the credible data already being produced by existing monitoring projects. Coordinating existing efforts saves limited resources and enhances those important efforts that have already been made. Standardized techniques will be used when they are compatible for local conditions. On a national level, the following monitoring programs provide guidelines and recommendations that this CWCS will consider:

- *US Geological Survey Status and Trends Program*—This program coordinates states' monitoring needs, standardizes protocols, and develops mechanisms to monitor the status and trends of biological resources.

- *Coordinated Bird Monitoring Group of the International Association of Fish and Wildlife Agencies*—This is a report used to motivate discussion among North American Bird Conservation Initiative partners on coordinating bird monitoring.

Monitoring Need

- Inventory of existing monitoring actions and plans
    - What is being monitored?
    - Who is monitoring?
    - What is not being monitoring?
    - What methods can be used to inventory?
    - What are the standard monitoring protocols?

Monitoring Projects

The following section details the projects for species-level monitoring. It is organized by taxa: birds, mammals, reptiles, amphibians, fish, and invertebrates.

Birds

There are 35 birds on the District's list of species of greatest conservation need, representing the largest percentage of species on the list after invertebrates. They are also some of the most studied and monitored species in the District. Therefore, there are many standard protocols and efforts already underway that have been established for years. Monitoring projects for other species taxa should be developed using lessons learned from the experience of the bird projects.

National Projects

Threatened and Endangered Species Monitoring[81]

USGS—The Patuxent Wildlife Research Center runs a Monitoring Avian Productivity and Survivorship (MAPS) station near the District.[82] The MAPS program was established by the Institute for Bird Populations and monitors the productivity and survivorship of breeding birds.[83] This CWCS will facilitate coordination of the surrounding region to integrate data on species of greatest conservation need and their habitats. The District will start a partnership among agencies and organizations, such as the Patuxent Wildlife Research Center, the DC Fisheries and Wildlife Division, and the Smithsonian Institution that are already conducting monitoring programs in the nearby area.

National Park Service (NPS)—There are various bird monitoring efforts occurring on the Parks within the District.

- National Capital Parks East (NACE) issued a permit to the Smithsonian Institute to establish a MAPS banding site at Fort Dupont. The District will coordinate with this program and open more MAPS stations across the District that would strategically capture species of greatest conservation need and their habitats.
- Rock Creek Park and Glover Archbold Park each have a Breeding Bird Census Area. These areas were established in 1959 by the Audubon Society and are monitored by volunteers several times per breeding season. Breeding birds are identified by singing males or by observation. Territories are delineated and mapped. The purpose of the survey is to record population levels in homogenous habitat to determine average population numbers in the region. Neotropical migrants are also recorded in these surveys.

[81] http://www.fws.gov/endangered
[82] http://www.pwrc.usgs.gov/
[83] http://www.birdpop.org/

- Rock Creek Park also conducts annual surveys on the creek and its tributaries of breeding waterfowl and the survivorship of their young. Mostly mallards and wood duck are recorded.

Regional Projects

- US Shorebird Conservation Plan[84]
- North American Waterbird Conservation Plan[85]
- North American Waterfowl Management Plan[86]
    - Atlantic Coast Joint Venture Strategic Plan[87]
- Partners in Flight North American Landbird Conservation Plan[88]
    - Partners in Flight Bird Conservation Plan for the Mid-Atlantic Piedmont[89]
    - Partners in Flight Bird Conservation Plan for the Mid-Atlantic Coastal Plain[90]

Local Projects

DC Fisheries and Wildlife—The Wildlife Research Branch of DC Fisheries and Wildlife conducts several bird monitoring surveys around the District.

- Weekly point counts at Kingman Island. Currently, these population studies provide presence and absence data regarding the status of bird species on Kingman Island. DC Fisheries and Wildlife staff plans to expand the amount of area covered by these counts.
- Winter shorebird and waterbird counts. Each winter, the Wildlife Research Branch staff conducts point counts of shorebirds and waterbirds along the Anacostia River. This study monitors the status of birds that migrate to and spend the winter within the District. As part of the CWCS, the Division plans to expand these counts to include a larger portion of the river, as well as the Potomac River. Since the start of this study, none of the species of greatest conservation have been seen very often on these counts,

[84] Brown et al. 2001. *US Shorebird Conservation Plan*, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.
[85] Kushlan et al. 2002. *Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan*, version 1. Waterbird Conservation for the Americas, Washington, DC.
[86] North American Waterfowl Management Plan Committee (NAWMP). 2003. North American Waterfowl Management Plan strategic guidance. US Fish and Wildlife Service, Arlington, VA.
[87] Atlantic Coast Joint Venture (ACJV). 2004. *Atlantic Coast Joint Venture strategic plan*. North American Waterfowl Management Plan.
[88] Rich, T.D., C.J. Beardmore, H. Berlanga, P.J. Blancher, M.S. W. Bradstreet, G.S. Butcher, D.W. Demarest, E.H. Dunn, W.C. Hunter, E.E. Inigo-Elias, J.A. Kennedy, A.M. Martell, A.O. Panjabi, D.N. Pashley, K.V. Rosenberg, C.M. Rustay, J.S. Wendt, and T.C. Will. 2001. *Partners in Flight North American landbird conservation plan*. Cornell Lab of Ornithology, Ithaca, NY.
[89] Partners in Flight. *Bird Conservation Plan for the Mid-Atlantic Piedmont*. College Park: University of Maryland, 2003.
[90] Partners in Flight. *Bird Conservation Plan for the Mid-Atlantic Coastal Plain*. Williamsburg: College of William and Mary, 1999.

but a goal of this CWCS to increase the numbers of some of those species in these areas, such as the Sora.

- MAPS bird banding program. The Wildlife Research Branch staff plans to establish a MAPS site in 2006 to begin monitoring the productivity and survivability of resident bird species in selected areas around the District.

Nongovernmental Projects

Natural Heritage Program (NHP)—see birds.

Breeding Bird Survey (BBS)—The BBS has been coordinated by the USGS since 1966 and is conducted by volunteers from the general public. It is a yearly effort to monitor the status and trends of bird species that breed within the District and across the country. Some of the most threatened species of greatest conservation need are breeders and the BBS is a source for long-term data on these species. BBS routes and data can be used to monitor the District's species of greatest conservation need.[91]

C&O Canal Midwinter Count— The C&O Midwinter Count is coordinated by the DC Audubon Society and is conducted by volunteers from the general public.

Anacostia Watershed Society (AWS)—AWS conducts surveys of resident Canada Goose populations at several times throughout the year. The count is conducted by volunteers.

Academic Projects

- *College of William and Mary*—proposed partners for the creation of an historical bird database

Standard monitoring protocol resources

Conway, Courtney J. 2004. *Standardized North American marsh bird monitoring protocols*. USGS, Arizona Cooperative Fish and Wildlife Research Unit.

DeSante, D.F. and K.M. Burton. *MAPS Manual: Instructions for the establishment and operation of stations as part of the Monitoring Avian Productivity and Survivorship program*. The Institute for Bird Populations. Point Reyes Station, CA.

Howe, Marshall, Jon Bart, Stephen Brown, Chris Elphick, Robert Gill, Brian Harrington, Catherine Hickey, Guy Morrison, Susan Skagen, and Nils Warnock, eds. 2000. *A comprehensive monitoring program for North American shorebirds*. Manomet Center for Conservation Sciences. http://www.manomet.org/usscp/files.htm

Bibby, C. J., N. D. Burgess, and D. A. Hill. 1992. *Bird census techniques*. Academic, London.

[91] http://www.pwrc.usgs.gov/bbs

IAFWA (International Association of Fish and Wildlife Agencies). 2004. *Monitoring avian conservation: Rationale, design, and coordination.* The Coordinated Bird Monitoring Working Group.

Steincamp, M., B. Peterjohn, V. Byrd, H. Carter, and R. Lowe. 2003 (Draft). *Breeding season survey techniques for seabirds and colonial waterbirds throughout North America*. Waterbird Monitoring Partnership of the Waterbird for the Americas Initative, US Geological Survey, Patuxent Wildlife Research Center.

Mammals

National Projects

Threatened and Endangered Species Monitoring[92]

National Park Service (NPS)

- Rock Creek Park conducts annual road kill surveys of all animals killed on roads in or adjacent to the park since 1982. The CWCS will fund this effort to be conducted on a more regular basis.
- Rock Creek Park conducts annual deer monitoring, including spotlight counts, road kill recording, and vegetation browse impact using exclosures and long-term vegetation plots.

Nongovernmental Projects

Natural Heritage Program (NHP)— see birds.

North American Bat Conservation Partnership (NABCP)— NABCP developed a "Strategic Plan" to remedy the insufficient knowledge of factors influencing North American bat populations and insufficient data on population status and trends, habitat requirements, and ecosystem roles that greatly impede focused and comprehensive recommendations for management. They seek to change the fact that land management practices are being implemented throughout the continent with little or no documentation of their effectiveness in mitigating damage or enhancing habitats for bats. In an effort to fill these knowledge gaps, biologists are now using a wide range of new technologies to investigate species distributions, population trends, and habitat requirements. To ensure the accuracy and utility of this new information, there is an urgent need to verify and standardize technologies and techniques.[93]

[92] http://www.fws.gov/endangered
[93] http://www.batcon.org/nabcp/newsite/

Standard monitoring protocol resources

Wilson, D.E., F.R. Cole, J.D. Nichols, R. Rudran, M.S. Foster. (eds.) *Measuring and monitoring biological diversity: standard methods for mammals.* 1996. Smithsonian Institution Press, Washington, DC.

Reptiles

National Projects

Threatened and Endangered Species Monitoring[94]

Nongovernmental Projects

Natural Heritage Program (NHP)— see birds.

Multi-sector Projects

Partners in Amphibian and Reptile Conservation (Parc)— Parc is a multisector conservation partnership of government agencies, conservation groups, universities, and industry. Their mission is to conserve herpetofauna and their habitats via public/private partnerships. Parc keeps a database of ecology and habitat requirements of herpetofauna so that information is accessible. Parc reviews, synthesizes, and publishes standardized data collection techniques to assure consistency in determining regional population trends, reporting declines or recoveries of species.[95]

Academic Projects

- *Richmond University*—existing reptile and amphibian monitoring program

Standard monitoring protocol resources

Amphibian and Reptile Monitoring Initiative (ARMI). USGS Patuxent Wildlife Research Center. http://armi.usgs.gov/index.asp

Southeast Amphibian and Reptile Monitoring Initiative (SE ARMI). Florida Integrated Science Center. Gainesville, FL. http://cars.er.usgs.gov/armi

ASIH (American Society of Ichthyologists and Herpetologists). 2004. *Guidelines for use of live amphibians and reptiles in field and laboratory research*, 2nd edition. Revised by the Herpetological Animal Care and Use Committee (HACC). Retrieved from http://www.asih.org/ pubs/ASIH_HACC_Final.PDF, April 18, 2005.

[94] http://www.fws.gov/endangered
[95] http://www.parcplace.org/

Amphibians

National Projects

Threatened and Endangered Species Monitoring[96]

National Park Service (NPS)

- Annual monitoring of vernal pools occurs at Rock Creek Park by USGS personnel with assistance from park staff, as part of the Amphibian Research and Monitoring Initiative (ARMI). Egg mass counts are conducted three times per season and calling surveys are conducted. This type of monitoring is also being done on the lower C&O Canal. ARMI is a national program of amphibian monitoring, research and conservation composed of Interior Department agencies. The USGS coordinates and leads the cooperative effort to study amphibian populations, measure and monitor environmental characteristics, and conduct research into potential causes of decline.[97]
- As part of ARMI, streamside salamanders in Rock Creek National Park are also monitored annually by USGS.

Nongovernmental Projects

Natural Heritage Program (NHP)— see birds.

Multi-sector Projects

Partners in Amphibian and Reptile Conservation (Parc)— see reptiles.

Academic Projects

- *Howard University*—existing amphibian monitoring program
- *Richmond University*—existing reptile and amphibian monitoring program

Standard monitoring protocol resources

Amphibian and Reptile Monitoring Initiative (ARMI). USGS Patuxent Wildlife Research Center. http://armi.usgs.gov/.

Dodd, C. Kenneth. 2003. *Monitoring amphibians in Great Smoky Mountains National Park*. USGS Circular 1258.

Heyer, W.R., M.A. Donnelly, R.W. McDiarmid, L.C. Hayek, and M.S. Foster (eds.) 1994. *Measuring and monitoring biological diversity: standard methods for amphibians*. Smithsonian Institution Press, Washington, DC.

[96] http://www.fws.gov/endangered
[97] http://armi.usgs.gov/

North American Amphibian Monitoring Program (NAAMP). USGS Patuxent Wildlife Research Center. http://www.pwrc.usgs.gov/NAAMP/protocol

Southeast Amphibian and Reptile Monitoring Initiative (SE ARMI). Florida Integrated Science Center. Gainesville, FL. http://cars.er.usgs.gov/armi

ASIH (American Society of Ichthyologists and Herpetologists). 2004. *Guidelines for use of live amphibians and reptiles in field and laboratory research*, 2nd edition. Revised by the Herpetological Animal Care and Use Committee (HACC). Retrieved from http://www.asih.org/ pubs/ASIH_HACC_Final.PDF, April 18, 2005.

Mitchell, J. C. 1997. *Amphibian monitoring protocols for Virginia*. Virginia Department of Game and Inland Fisheries, Richmond, Virginia.

Jung, R. E. 2002a. *Streamside salamander inventory and monitoring, Northeast Refuges and Parks*. Patuxent Wildlife Research Center, U.S. Geological Survey, Laurel, Maryland.

Jung, R. E. 2002b. *Wood frog and spotted salamander egg mass counts and percent vernal pools occupied by amphibian species on DOI lands in the northeastern United States*. Patuxent Wildlife Research Center, U.S. Geological Survey, Laurel, Maryland.

Fish

National Projects

Threatened and Endangered Species Monitoring[98]

Nongovernmental Projects

Natural Heritage Program (NHP)— see birds.

Local Projects

DC Fisheries and Wildlife— The Fisheries Research Branch staff is conducting several monitoring programs for the District's fish species in greatest conservation need. The Branch monitors migratory and resident fish and assessing water quality conditions and the state of aquatic habitats. Current monitoring projects include:

- Anadromous and resident fish surveys
- Ichthyoplankton studies to determine the spawning success of both anadromous and resident fish species
- Research to determine age and growth rate of fish
- Monitoring and evaluation to assess and improve fish habitat
- Monitoring to assess the yearly trends of the extent, density, and species composition of submerged aquatic vegetation

This data is used to determine and project growth trends and identify the conservation needs of the District's fish species. The data guides the Division in determining the most effective conservation actions for the 12 fish species of greatest conservation need for the District's CWCS.

Standard monitoring protocol resources

AFS (American Fisheries Society), AIFRB (American Institute of Fishery Research Biologists), and ASIH (American Society of Ichthyologists and Herpetologists). 2004. Guidelines for the use of fishes in research. Revised by the Use of Fishes in Research Committee. Retrieved from http://www.fisheries.org/html/Public_Affairs/Sound_Science/Guidelines2004.shtml, April 18, 2005.

Nielsen, L.A. and D.L. Johnson (eds.). 1983. *Fisheries Techniques*. American Fisheries Society, Bethesda, Maryland.

Karr, J.R. 1981. *Assessment of biotic integrity using fish communities*. Fisheries 6:21-27.

[98] http://www.fws.gov/endangered

Karr, J.R., K.D. Fausch, P.L. Angermeier, P.R. Yant, and I.J. Schlosser. 1986. *Assessing biotic integrity in running waters: a method and its rationale*. Illinois Natural History Survey, Champaign, IL.

Atkinson, J. 2002. *Shenandoah National Park fisheries monitoring protocol*. Natural Resources Branch, Division of Natural and Cultural Resources, Shenandoah National Park.

Invertebrates

The number of invertebrate species of greatest conservation need represented in this CWCS is probably lower than it would actually be. Due to gaps in invertebrate monitoring within the District, the status of many invertebrate populations is unknown. The number given in this CWCS represents the number of SGCN given current knowledge. One of the first steps in conserving invertebrate species of greatest conservation need within the District is to do a comprehensive inventory of all invertebrates to determine which species are in need. Invertebrate surveys and research is a strategy of the District's CWCS. Still, given current knowledge, there are 51 invertebrate species of greatest conservation need, giving invertebrates the highest percentage of species of greatest conservation need than any other wildlife taxa.

National Projects

Threatened and Endangered Species Monitoring[99]

Hay's Spring Amphipod (*Sygobromus hayi*) Project

Hay's Spring amphipod is a federally endangered species that is endemic to the springs of Rock Creek Park. There is little known about the biology, population dynamics, or ecological community of this amphipod. Indeed, subterranean species are difficult to monitor since they appear seasonally and sporadically in seeps and springs or may not appear even during high water flows. It spends its life in a shallow groundwater zone, moving in water that percolates among sand grains and gravel until it is flushed out by large volumes of water into a spring. Therefore, universities, the US Fish and Wildlife Service, and the MD Department of Natural Resources (MD DNR) provide assistance to Rock Creek Park in terms of developing monitoring question and gathering and analyzing data for the Hay's Spring Amphipod.[100]

[99] http://www.fws.gov/endangered
[100] Pavek, Diane. *Endemic Amphipods in our Nation's Capital*. Endanged Species Bulletin, Jan/Feb 2002. Vol. xxvii, no. 1, p.8,9.

Kenk's Amphipod (*Stygobromus kenki*) Project

Kenk's amphipod is a species of greatest conservation need that is endemic to the springs of Rock Creek. One of the highest conservation priorities for this species is to learn more about it. A two-year study by an American University professor will be conducted in Rock Creek Park to determine the status of Kenk's Amphipod. The study will also monitor other groundwater invertebrates as well as spring outflows, which is a priority habitat of this CWCS. The method is a direct sampling of the fauna that should reduce sampling error. MD DNR, with funds from the US Fish and Wildlife Service, will monitor the status of Kenk's Amphipod by conducting surveys outside of national parks.[101]

Nongovernmental Project

Natural Heritage Program (NHP)— see birds.

Academic Projects

- *American University*—see Kenk's Amphipod monitoring project

Standard monitoring protocol resources

NABA (North American Butterfly Association). 2005. 31st Annual NABA Butterfly Count – 2005 instructions (USA). North American Butterfly Association. Posted at: http://www.naba.org/counts.html.

New, T. R. 1998. *Invertebrate surveys for conservation*. Oxford University, New York, New York.

Strayer, D. L. and D. R. Smith. 2003. *A guide to sampling freshwater mussel populations*. American Fisheries Society Monograph 8, Bethesda, Maryland.

Voshell, J. R. and S.W. Hiner. 1990. *Shenandoah National Park long-term ecological monitoring system, section III, aquatic component user manual, NPS/NRSHEN/NRTR-90/02*. Department of Forestry, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

[101] Pavek, Diane. *Endemic Amphipods in our Nation's Capital*. Endanged Species Bulletin, Jan/Feb 2002. Vol. xxvii, no. 1, p.9.

Monitoring Conservation Actions

The second level to the District's approach to monitoring is to monitor conservation actions. In order to facilitate Required Element # 6, the review and revision of the CWCS, there must be a protocol and procedure for monitoring the conservation actions proposed in this CWCS. This section:

- Sets project level performance indicators and criteria to measure the success of the conservation actions, and
- Develops corresponding adaptive management techniques.

Performance Indicators and Criteria

- Did the action occur?
    - Reporting of projects to supervisors
- Was the action cost-effective?
    - Time/money guidelines from the International Association of Fish and Wildlife Agencies
    - Develop a cost accounting system
- Was the action effective?
    - Use of indicator species
    - Use of project tracking database
    - Survey of biologists and resource managers
- Were the targets met?
    - Assign measurable goals to conservation actions
    - Evaluation of projects by supervisors
- Were all interested stakeholders involved?
    - Federal, state, local, private, nongovernmental
- Was the public invited to participate?
- Were their any consequences?
- What was public opinion of the action?

Multi-level Monitoring

The District followed the multi-level approach to monitoring conservation actions as developed by the US Forest Service (USFS). The USFS makes distinctions among the levels of monitoring that guides the questions asked during the monitoring process and guides the development of goals for the monitoring program. The levels include:

1. *Implementation Monitoring*—This is a simple record of progress toward a specific goal, and whether they were implemented as planned.[102] For example, did a park spray for invasive species?

2. *Effectiveness Monitoring*—This determines whether the conservation action was effective.[103] For example, did spraying a specific amount of invasive species remove or significantly reduce the threat of invasive species in the park or the District?

3. *Validation Monitoring*—This monitors the link between cause and effect to validate the development of the management decision.[104] For example, is spraying invasive species an effective strategy for targeting the threat of invasive species? Is there a better way to reduce invasive species? Is there a more cost effective way to reduce invasive species?

Specific examples from the District's CWCS

Example #1: Using a land exchange to prevent habitat loss
Possible performance indicator for the action—

- How much land was saved due to a land exchange? (*implementation monitoring*)
- Did the land exchange prevent habitat loss of grasslands and managed meadows? (*effectiveness monitoring*)
- Are land exchanges an effective action for habitat loss, or is there a more cost-effective strategy? (*validation monitoring*)

Example #2: Increasing enforcement to stop dumping
Possible performance indicator for the action—

- Did increased enforcement decrease dumping? (*implementation monitoring*)
- Did it protect early successional/ shrub-scrub/ edge habitats from dumping? (*effectiveness monitoring*)
- Is there a more effective way to prevent dumping? (*validation monitoring*)

[102] http://www.for.gov.bc.ca/hfp/frep/5_types_of_eval.html
[103] Ibid.
[104] Ibid.

More examples

- What is the status of the District stormwater control plan? How has it impacted rivers and streams?
- Did surveys help fill research and prioritization gaps for invertebrate species?
- Did involvement in the planning process result in smart growth?
- Did implementation of best management practices reduce stormwater erosion in hardwood forests?
- Did preserving groundwater recharge areas reduce changes to hydrologic regimes in tidal mudflats?
- Did stream bank restoration help reduce erosion in ponds and pools?
- Did designating areas as "critical" limit the impact of the change in land use of forested wetlands/ riparian woodlands/ floodplains?
- Did educational outreach reduce poaching from vernal pools?
- Was a goose management plan approve to address the threat of overbrowsing of emergent tidal wetlands?
- Was the Exotic Plants Management Team implemented District-wide?
- Is pollution still a threat to emergent non-tidal wetlands?
- What are the results of the monitoring project for parasites and pathogens in urban landscapes?
- Was the introduction of submerged aquatic vegetation to new sites successful? What are the sites?

Another tool for monitoring conservation actions is receiving feedback from conservation planning organizations. The Nature Conservancy and Defenders of Wildlife were participants in the development phase of the CWCS and will be very active in the implementation phase as well. Both groups have a great deal of experience in conservation planning and have very valuable expertise to bring to this monitoring program.

Coordination among the neighboring states of Maryland and Virginia will also be a strategy of this monitoring program. Since the District shares many species of greatest conservation need, priority habitats, and threats with the surrounding region, strategic conservation planning includes being consistent with and communicating with the region. Exchanging monitoring data and success stories, as well as methods is a strategy of the District's CWCS.

Adaptive Management of Conservation Actions

- Based on performance indicators and criteria, how should conservation actions be changed?
- Based on the monitoring of status and trends of species, habitats and threats, how should conservation actions be changed?
- Are the conservation actions meeting the goals of the District's CWCS?
- Communication among Working Group partners; data exchange regarding project success, recommendations, needs, priorities
- Establishment of a database that assesses success data, needs, priorities

Review and Revision

The DC Fisheries and Wildlife Division, with the continued help of the Working Group, will review and revise the CWCS, as required by Element #6. The Working Group will establish a very detailed schedule, which will include annual, biannual, as well as third, fourth and fifth year reviews and evaluations of the strategy. A comprehensive revision of the Strategy will occur every five years. The review and revision process will occur using the following timeline:

- Within the first year of the implementation phase of the CWCS—the Working Group will set short and long term measurable goals and timetables for each conservation action that allow for adaptive management and application of performance indicators.

- Biannually after goals and timetables have been set—goals will be reviewed to evaluate whether the goals have been achieved based on the timetable and determine if any new goals or adjustment need to be made based on new information.

- Years three and six after implementation—conservation actions will be reviewed and evaluated to determine if that conservation action is still needed and to establish new conservation actions based on new data and information.

- Years four and eight after implementation—the current top five threats and strategies will be reviewed and evaluated to determine if any changes or reprioritizations are needed based on new information and conditions.

- Years five and ten after implementation—the entire CWCS will undergo a comprehensive review and evaluation. In addition to the reviews in the other years of the goals, conservation actions, strategies and threats, the comprehensive review will reevaluate and update the District's list of species of greatest conservation need, priority habitats and maps, threats, and tables based on the most current information available.

Return